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G92-1109 Musk Thistle

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Musk Thistle

The history, identification and chemical, mechanical and cultural control of musk thistle are discussed.

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- [Appearance](#)
- [Its Origin and Spread](#)
- [Control with Herbicides](#)
- [Caution](#)
- [Mechanical and Cultural Control](#)
- [Biological Control](#)

Musk thistle is a major problem for many Midwestern landowners. It reduces forage yields by robbing moisture and plant food from palatable grasses. Livestock refuse to enter heavily infested areas and will not graze close to the spiny plants.

Since its emergence as a serious weed problem in the late 1940s, musk thistle has invaded thousands of acres of Nebraska pastureland and even occurs in some cultivated fields. It has moved from the Kansas border to the South Dakota border and as far west as Colorado and Wyoming.

Appearance

Musk thistle (*Carduus nutans* L.) is also known as nodding thistle. It is a relatively new weed in Nebraska. The deep reddish purple flowers are large and attractive. The head is solitary on the end of the stem and nods or hangs down as it grows in size.

The deeply cut (segmented) leaves are dark green with a light green midrib. There is a grayish-green area at the outer edge of each spine-tipped leaf segment. The leaves extend onto the stem, giving it a winged or frilled appearance. The plant is relatively free of hairiness. Plant height varies between 2 and 7 feet.

Musk thistle is a prolific seed producer. Large, extensively branched plants in sparse stands may have 100 or more heads with a total production of about 20,000 seeds. Individual terminal heads have been found with as many as 1,500 seeds. Smaller plants and those in thicker stands may produce from 5,000 to 10,000 seeds per plant.

Blooming starts with the terminal head the first week in June and continues until mid-August with lower branches. The main terminal head and terminal heads of the upper branches bear the bulk of the plump, well-

filled seeds. Germination of these seeds may run as high as 95 percent shortly after dissemination.

Musk thistle is primarily a biennial weed and normally requires two growing seasons to complete its life cycle. However, under conditions of reduced competition such as with fall-sown grains, it may perform as a winter annual where the seeds germinate and start growing in late summer or fall and bloom the following spring.

A close relative, plumeless thistle (*Carduus acanthoides* L.), is found at several scattered locations in Nebraska. The general appearance of plumeless thistle is somewhat similar to musk thistle. The heads are smaller. The leaves are more finely cut and may vary from sparsely to noticeably hairy, particularly along the leaf veins and stems.

Its Origin and Spread

Musk thistle has been found in the United States for nearly 100 years. In the early 1900s it was listed as a weed in Pennsylvania, the District of Columbia, and New Jersey northward to New Brunswick and westward to Iowa. It probably came from Europe where it was grown as an ornamental.

None of the extensive plant collections made in Nebraska during the late 20s and 30s contain musk thistle specimens; however, in 1932 a specimen was brought to a field day in Seward County for identification, and a 1940-41 botanical survey found it near Dawson in Richardson County.

These scattered reports, references, and collections indicate that it wasn't until sometime between 1945 and 1950 that musk thistle emerged as a weed species of economic importance. By 1959 it was such a pest in eastern Nebraska pastures and waste areas that the Nebraska Legislature declared it a noxious weed.

Control with Herbicides

Herbicides applied for musk thistle control must not only suppress the plant but must prevent it from producing seed. If herbicide application is delayed until the plant flowers, the plant will eventually die but viable seed production may have still occurred. Musk thistle has the ability to establish new seedlings in warm periods in late fall and early winter and may continue to spread. Research by the Agricultural Research Service and University of Nebraska has shown that late September or October treatments with one pound per acre of 2,4-D provides good musk thistle control. In addition, Tordon 22 at 6 to 8 ounces per acre or one pound 2,4-D plus 1/2 pint Banvel applied in the late rosette stage showed more consistency than 2,4-D applied alone in controlling musk thistle.

Several other herbicides, Ally, Curtail, and Stinger also control musk thistle and all are approved for use in pasture. During tests when Ally, Banvel + 2,4-D, 2,4-D, Stinger, or Tordon were applied to musk thistle in the rosette or bolting growth stage, plants were suppressed and seed production was dramatically reduced (*Table I*). When these same herbicides were applied to musk thistle in the bud to early bloom growth stage, plant suppression was reduced and plants produced significant quantities of viable seed.

Table I. Response of musk thistle to herbicides.

Herbicide treatment	Product per acre	Musk thistle stage of growth at time of application	Percent musk thistle control in mid July	Seed collected from 20 heads
Ally	0.3 oz	rosette	83	0
		bolting	87	0
		bud	48	5

		early flower	46	25
2,4-D amine	2 qt	rosette	96	0
		bolting	92	0
		bud	73	360
		early flower	75	200
2,4-D + Banvel	1 qt + 0.5 pt	rosette	92	0
		bolting	95	0
		bud	84	30
		early flower	86	50
Stinger	5.5 oz	rosette	99	0
		bolting	97	5
		bud	70	90
		early flower	72	220
Tordon	8 oz	rosette	98	0
		bolting	96	20
		bud	66	60
		early flower	73	360

Musk thistle is one of the earliest flowering thistles. The first flowers appear around June 1 to June 15 in the southern and western parts of the state, respectively. Flower stalk lengthening (bolting) begins about one month before bloom. Along the Kansas-Nebraska border, begin treatments between April 15 and May 1. As you move further north or west, spray about 10 days later. Regardless of location, make sure spring treatments are applied before stems lengthen and rapid plant growth begins.

Caution

Do not group lactating dairy cows on pastures treated with 2,4-D or Banvel for one week after treatment. Traces of chemical may be found in milk where lactating animals grazed 2,4-D or Banvel sprayed forage before one week had passed. Observe all precautions and instructions printed on the label concerning the use and handling of pesticides.

Mechanical and Cultural Control

If an area of infestation has been allowed to get to the bud or bloom stage, mowing will temporarily prevent seed production. Plants in the early bloom stage usually don't resprout. However, some plants in a stand will be less mature and will resprout, necessitating additional control measures.

Musk thistle does not become troublesome in spring planted crops. Badly infested fields that are tillable could be cropped for two to three years with row crops or spring small grain. Normally, musk thistle does not affect fall sown wheat, rye, or barley unduly, but occasionally it sets seed by harvest. The Nebraska Crop Improvement Association has rejected wheat fields for certification because of the presence of musk thistle.

Grassland that is properly managed--well-fertilized and not grazed too closely--is less subject to infestation, however, not even the best managed pastures are immune. Musk thistle plants have been found in brome grass fields that have been protected from grazing for several years. Control isolated plants in grassland by cutting

the plant below the soil surface.

Biological Control

When a plant is introduced to an area, natural enemies which help suppress it are sometimes left behind. This apparently happened when musk thistle entered North America. In European countries where musk thistle has existed for hundreds of years, it is little more than "another weed". Natural enemies control it.

One of those natural enemies, the musk thistle seed weevil, *Rhinocyllus conicus*, was introduced into the United States from southern Europe in 1969. Successful releases have been made in Nebraska since 1972.

The weevils overwinter as adults. In mid-May to mid-June the adults congregate on bolting musk thistle plants, feed, mate, and deposit eggs. The larvae feed at the base of the flower and interfere with seed production and viability.

During early stages of colony establishment, insect numbers are concentrated in the terminal head and terminals of upper branches. Some late flowering, small heads that are low on the plant will probably escape infestation, resulting in limited seed production even after the insects are established. Generally weevil populations need six to eight years to build up before appreciable reduction of musk thistle seed production can be observed. After this time thistle populations should decline as the thistle seed supply in the soil is depleted.

Musk thistle weevils can be introduced at different times. They are collected as adults during spring feeding or as larvae or pupa in the heads during July. They are then transported to the new site. A minimum of 500 adults or seed heads should be collected for the new location.

New release sites should not be grazed, mowed, or sprayed for two years. Mowing is most detrimental. Herbicides can be used in areas adjacent to the release site without harmful effects. All indications are that *R. conicus* and herbicides for musk thistle control are compatible and can be integrated into an effective control program for minimum seed production.

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